

Anadarko Petroleum

Anadarko is....

One of the world's largest independent exploration and production companies.

Committed to Health, Safety and Environment.

Active in major resource plays across the U.S. onshore, including Colorado, Texas and Pennsylvania, and in the deep water Gulf of Mexico, with additional activity in Africa, South Africa, New Zealand and China.

Committed to its Core Values of: Integrity and Trust, Servant Leadership, People and Passion, Commercial Focus, Open Communication.

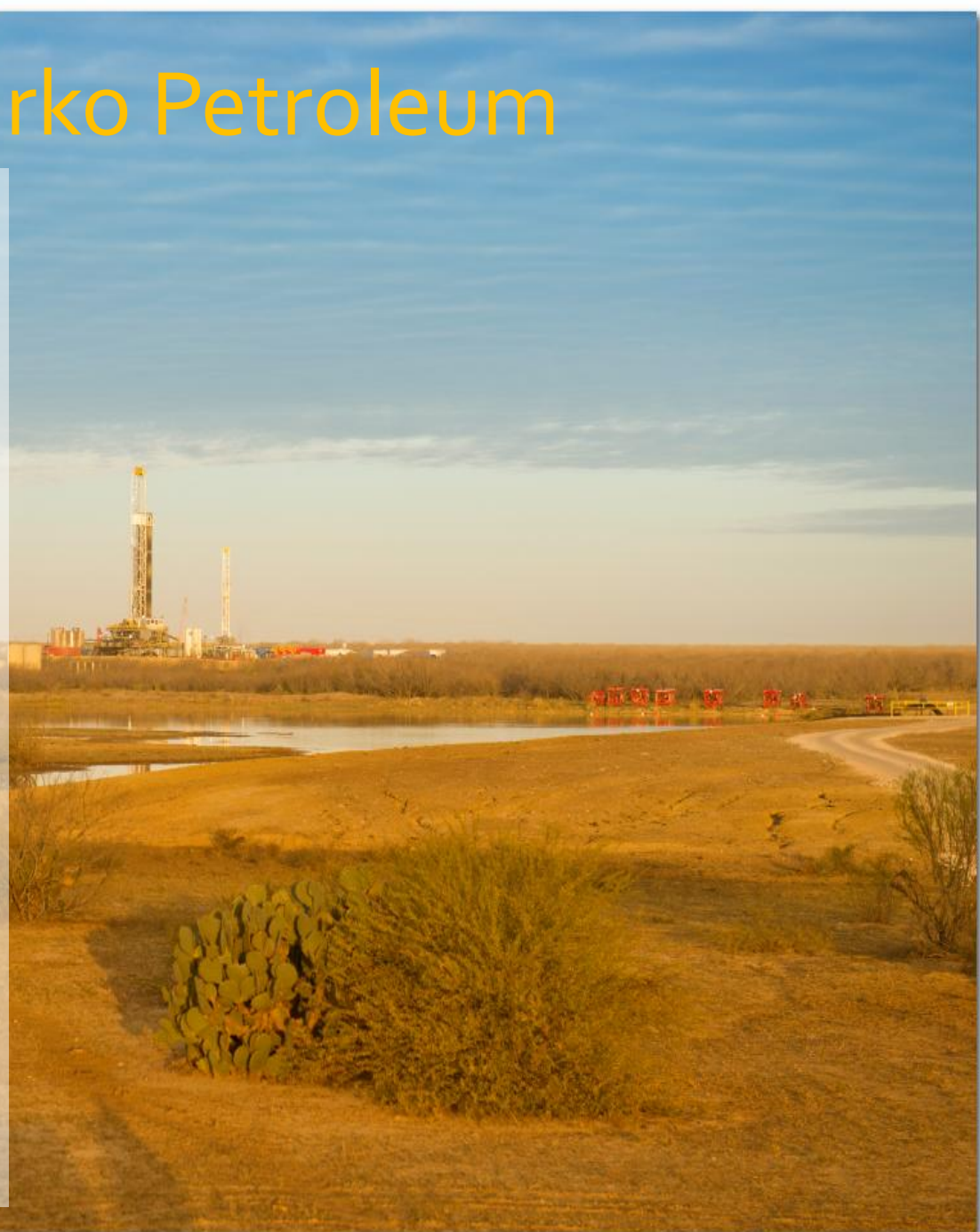
An integral part of the communities where we live, work and operate.

Producing energy resources that are vital to the world's health and welfare.

Recognized as a Top Workplace in Houston, Denver and across the nation.

A *Fortune* 200 Company.

Recognized among the World's Most Innovative Companies by *Forbes* in 2012.



In 2013, carbon emissions in the U.S. dropped to their lowest levels since 1994 due to the increase in natural gas-fired electricity generation. - U.S. EPA

Air Quality

Natural gas is the cleanest-burning hydrocarbon on the planet.

Most pollution in the U.S. is driven by the transportation and utility sectors. By expanding natural gas for vehicles instead of gasoline and diesel, crude oil consumption could be reduced by 25%, emissions lessened by 20% and greenhouse gases lowered by up to 30%.

With increased natural gas-fired electricity generation in the electric power sector, sulfur dioxide (SO₂) emissions could be reduced by 55%, mercury emissions lowered by 30% and greenhouse gas emissions reduced by 15%.

FACTS

- Emissions in the U.S. are at their lowest levels since 1994 due to the increase in natural gas for electric-power generation.
- Total CO₂ emissions in the U.S. will remain below their 2005 levels between now and 2040 due to increasing natural gas use.
- The U.S. is the second largest natural gas producer in the world and yet has less than 1% of the world's NGVs in use.
- Producing electricity from natural gas creates 36% to 47% lower emissions than producing electricity from coal.

WHAT WE CAN DO



Converting one heavy-duty waste truck from diesel to natural gas ...

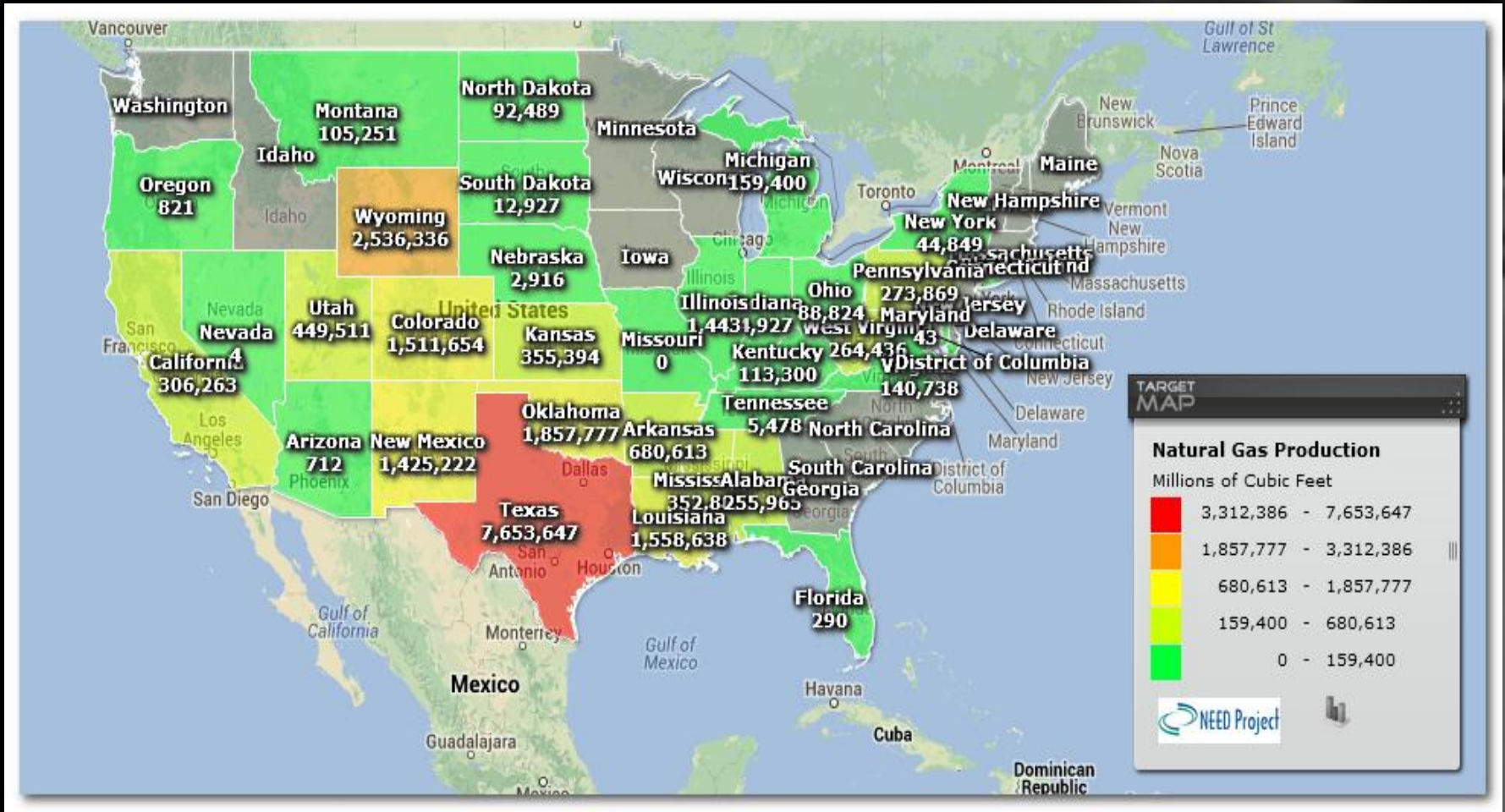
Offers the emissions-reduction equivalent of removing 325 vehicles from the road.

Domestic Natural Gas Production by State – 2009

Texas production as a % of total US production

2009 - 29.3%

2013 - 27.2%

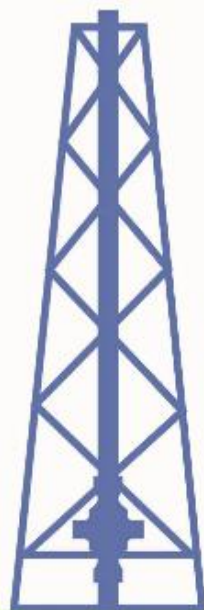


- The United States produces over 90+ percent of total domestic consumption
- Compared to crude oil, only about one-quarter to one-third of consumption is met by domestic production
- Because of its abundant natural gas resource, the United States is much less reliant on other countries for its natural gas supply than it is for its supplies of crude oil.

NATURAL GAS DEMAND

TRANSPORTATION VS. POWER GENERATION

ROUGHLY
SIX HOURS
OF U.S. NATURAL GAS
PRODUCTION



approximately
17 BILLION
CUBIC FEET (bcf)

CAN PROVIDE ONE YEAR'S ENERGY FOR:



1 ELECTRIC
PLANT
SERVING
200,000
HOMES

—OR—

A large number of small blue icons of long haul trucks, arranged in a grid. Each truck is a simple silhouette with a trailer.
8650 LONG HAUL TRUCKS

—OR—

A large number of small blue icons of Honda Civic cars, arranged in a grid. Each car is a simple silhouette.
304,000 HONDA CIVICS



ASSUMING:

Long-haul trucks get 5.8 mpg of diesel equivalent and travel 90,000 miles a year.
A NGV Honda Civic has a fuel economy of 31 mpg of gasoline equivalent and travels 15,000 miles a year.
A 400 megawatt combined cycle natural gas fired power plant @ 65% capacity factor, with 7.5 MMBTU/MWh heat rate.
For comparison, the average home consumes roughly 1 megawatt hour per month.

Energy Density of Various Forms of Energy

Small Footprints and Big Power Outputs



***How Many Acres to Produce
2,700 Megawatts of Power?***

Corn ethanol

Area covered: 21,267 sq. miles
Power density: 0.25 hp/acre

Biomass-fueled power plant

Area covered: 2,606 sq. miles
Power density: 2.1 hp/acre

Wind

Area covered: 869 sq. miles
Power density: 6.4 hp/acre

Solar PV

Area covered: 156 sq. miles
Power density: 36 hp/acre

Oil stripper well (10bbbls/day)

Area covered: 39 sq. miles
Power density: 148.5 hp/acre

Average US natural gas well

Area covered: 19.6 sq. miles
Power density: 287.5 hp/acre

Nuclear Plant

Area covered: 18.75 sq. miles
Power density: 300 hp/acre

Anadarko's Fleet



Anadarko's Fleet

- 2,357 domestic light duty trucks, sedans - 662 in Texas
- 59 heavy & medium duty trucks - 6 in Texas
- To date we have converted 400+ light duty trucks to a bifuel configuration
- Conversions are done by up fitting companies like Westport, Venchurs, Parkway Chevrolet, OEM systems
- Conversions typically account for \$8 - \$10K in incremental cost
- Conversion does not affect vehicle warranty
- Depending on cng fuel prices, incremental cost recovered at 60,000 mile mark
- Vehicles driven 95 – 120K miles over their life and average 12-16 mpg
- Anadarko's fleet consumes approximately 5 million gallons of fuel per year
- \$2/gallon savings on fuel could theoretically save the company up to \$10 million/year
- Reality is that a bi-fuel truck deployed in the oil field will not displace 100% of unleaded with CNG due to infrastructure limitations

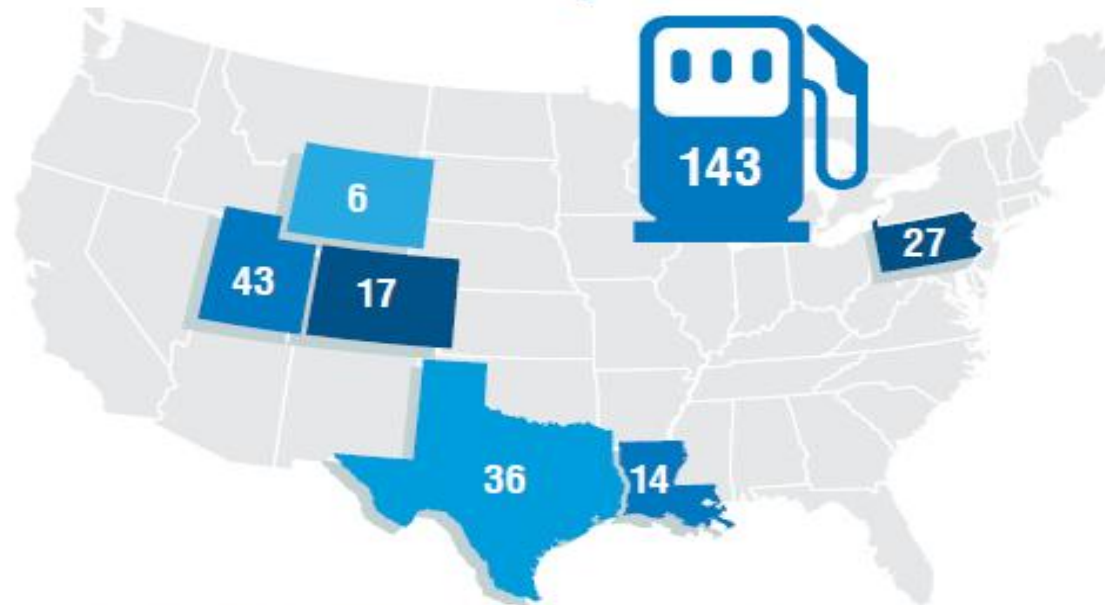
Challenges Facing The Fleet Manager

- Incremental cost of alternative fuel vehicles is high along with a limited but growing infrastructure
 - Focus on vehicles being driven the most miles per year with the lowest mpg rating
 - Consider creative financing of the alternative fuel conversion costs
 - Take advantage of government (Federal & State) sponsored incentives when possible
 - Find lowest cost fuel source through negotiation, joint ventures and private station development
 - Take advantage of fueling infrastructure being built along the Texas Clean Transportation Triangle
- Vehicle choices so you can remove the worst air quality offenders in order to gain the largest impact
 - Heavy Duty manufacturers are producing several options to meet needs of long haul trucks, trash trucks, drayage, short haul , concrete mixers and others
 - Organizations like ANGA and AGA have worked with the OEM's to bring options to the commercial market
 - ANGA has sponsored production of 6 prototype cars as examples for OEM's to consider.





CNG Fueling Stations in States with Anadarko Activity



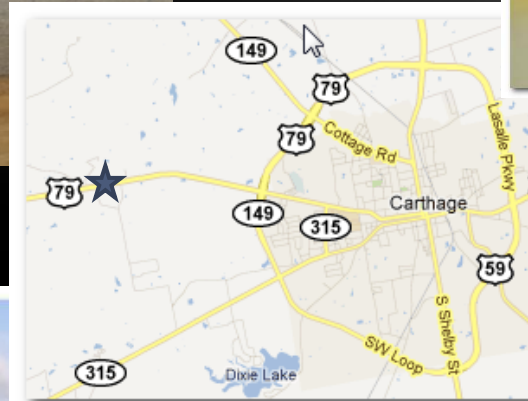
Locate a public CNG Fueling Station near you at www.afdc.energy.gov.

TAKEAWAYS

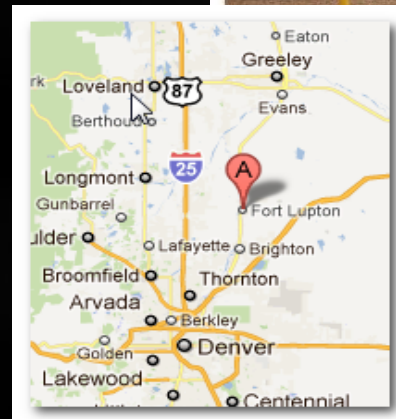
- Natural gas emits less CO₂ and local pollutants than other fuel sources.
- Producers are increasing the use of clean-burning natural gas in their own operations to reduce air emissions.
- Utilizing natural gas for base-load power will help reduce emissions from electricity generation.

Anadarko's Carthage, TX CNG Fueling Station

APC vehicles in Carthage burn approximately 100,000 gallons of fuel/yr.
Anadarko domestic based vehicles burn over 5MM gallons/year



Ft. Lupton, CO Station



Alternative Fuels in E&P Operations



Scan Patriot Rig – 3/3/14

Anadarko domestic drilling rigs burn approximately 20 million DGE's/yr



Challenges Facing The Deployment of Alternative Fuels in Drilling and Frac Operations

- Meeting the air quality standard for the area and the availability of alternative fuel near area of operations
 - What the heck are you talking about, isn't the rig sitting on top of the fuel?
 - Source from nearest compression facility able to meet demand and willing to do business
 - Set up compression operation at or near owned fuel gas lines or processing plants
 - Be mindful of strain placed on public infrastructure
- Availability of alternative fuel capable equipment
 - Drill rigs and frac fleets are equipped with expensive high horsepower diesel generators
 - Conversion to bifuel operation is somewhat expensive
 - Equipment owner is typically under contract to E&P company and not responsible for fuel usage or purchases
 - Negotiate as a requirement for doing business
 - Share in cost savings
 - Bear or share in the cost of aftermarket kit installation – capital recovery in 4 – 8 months

END

Questions?

<http://www.cngnow.com/stations>

